



SUBSTITUTE SHEET 1

SEQUENCE LISTING

<110> Demmer, Jeroen
Shenk, Michael Andrew
Hall, Claire
Fish, Steven A

<120> Compositions isolated from forage
grasses and methods for their use.

<130> 11000.1070U

<150> 60/409,557

<151> 2002-09-09

<160> 44

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 841

<212> DNA

<213> Lolium perenne

<400> 1

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aacaatattg	tatctgggag	caaccatggt	gtatatggga	acaacaaagt	cgtgacagga	780
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<210> 2

<211> 959

<212> DNA

<213> Festuca arundinacea

<400> 2

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ctcttgccgg	cgccgagcgc	cgcgtcacgc	caccctgatg	acctccgcgc	cctgcaggac	180
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ccattacatg	tgaagtctag	ccaaggaaca	ctcgacgaag	aacacaatac	aataactggg	420
atcaacaata	ctgtcaaatc	cgggagcaac	aatgttggtt	ctgggaacga	taacactgtc	480

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<210> 3

<211> 980

<212> DNA

<213> *Lolium perenne*

<400> 3

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<210> 4

<211> 996

<212> DNA

<213> *Festuca arundinacea*

<400> 4

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tgtgtctggg	agcaacaaca	ctgttgtaac	tgggaagtgc	aacactttag	ttggtagcaa	660
ccatgtcgt	tcagggacaa	agcatattgt	tactgataac	aataatgttg	tatccgggaa	720
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<210> 5
 <211> 1084
 <212> DNA
 <213> *Lolium perenne*

<400> 5
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 gctgcgatgg tacaagcggc cgcgtcacgg cgttgcggtt tccgattagc ctcgaggact 300
 gcggtaagct caagtcgctc aaccttgcca acgaaagatt ggttggcacc atcccgtcgt 360
 ggattggtga gcttgaccac cattgctact tggttctctc ggataattca ttggttggtg 420
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 gtcgttcact aggtatggct ttcgctaaca tgccattgca tgtgaagggg aaccgaagaa 540
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 acaatgctgt ttctgggaac gacaacactg tcatatgtgg gaacaacaac actgtgtctg 660
 ggagcaacaa caccattgca tctggcagtg acaatatcgt aactggcagc aaccatattg 720
 tatgtgggac caaacatata ataactgata acaacaatga cgtatccggc aatgataata 780
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 aatgatttgt caggggattg ctcccatctt tcctaaagga gctctcacc tagtccaagt 960
 tcggtgcagc tcacaatcac ttggtagggg caatcgagtt atgtaacttc atggatatag 1020
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 aaaa 1084

<210> 6
 <211> 1230
 <212> DNA
 <213> *Festuca arundinacea*

<400> 6
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 ccggccgcga gcgcgacgtc gtgccacccc gatgacctcc gcgcgctgcg tggctttgtc 180
 gggaaacctca atggcggggg tgtccttctt catggagcat ggtccggctc cttatgttgc 240
 gcctgggaag gcgtgggctg cgatggtaca agcggccgcg tcacggcatt gcggcttccg 300
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 gctggctcgtt cactaggtat ggctttcgtt aacatgccat tgcattgtgaa gggcaaccga 540
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 taataaacat atttttgttg aaaaaaaaaa 1230

<210> 7
 <211> 1212

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<212> DNA

<213> Lolium perenne

<400> 7

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acatatca	actgataa	acaatgac	atccggca	gataaca	tatctggg	780
cttccata	gtatccgg	gccacaat	tgtatctg	agtaaca	ctgtatct	840
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agtttaaa	tattttct	aaaatatc	acatacat	tgatatga	atcaaagg	1080
gctttcac	agctgatg	tacgtgtt	cttatgtg	aatttgc	gacatgca	1140
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<210> 8

<211> 1064

<212> DNA

<213> Lolium perenne

<400> 8

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ctggtcgg	ccatccca	gtggattg	gagcttg	accttctc	cttgga	420
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ttactagg	tggctttc	tagcatgc	ttggatgt	agccta	aagaactc	540
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actgtgtc	ggaatgac	cactgtca	tcgggga	acaatact	gtctggga	660
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<210> 9

<211> 1246

<212> DNA

<213> Festuca arundinacea

<400> 9

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<210> 10

<211> 1008

<212> DNA

<213> *Lolium perenne*

<400> 10

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<210> 11

<211> 1006

<212> DNA

<213> *Festuca arundinacea*

<400> 11

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cgttggtgctgc	gacggtgcca	gcggccgtgt	cacggctttg	tggctcccca	ggagcggcct	300

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cacggggcca	atcccatcgt	ggatttgtca	gcttcaccac	ctacgtact	tggatctttc	360
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cgctgccggt	cgttcggggt	tcaccaacat	gccattgcat	gtgatgcgta	acagaagatc	480
actcgacgag	cagcccaata	caatatctgg	gagcaacaat	actgtcagat	ccgggagcaa	540
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actgtacctc	acagtcagtt	ggtgcgttca	atcgcgttat	gtaacttcat	ggatatacca	960
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<210> 12

<211> 1007

<212> DNA

<213> Lolium perenne

<400> 12

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cggccggcac	ggcgacggcg	acggcgacgc	catgccaccg	cgatgacctt	cgcgcgctgc	180
ggggcttcgc	tgagaacctg	ggcggcgggc	gcgcactcag	cctccgcgcc	gcgtggtcag	240
gcgcctcatg	ctgcgattgg	gaaggcggtg	gctgcgacgg	tgccagcggc	cgtgtcacgg	300
ctttgtgggt	ccccaggagc	ggcctcacgg	ggccaatccc	gtcatggatt	tttcagcttc	360
accacctacg	ctacttggat	ctttcaggta	atgcattggg	tggcgaggta	cccaagaatc	420
tgcagggtaca	gctcaaaggc	atcaccaaca	tgccattgca	tgtgatgcgt	aacagaagat	480
cactcgacga	gcagcccaat	acaatttctg	ggagcaacaa	tactgtcaga	tccgggagca	540
aaaatgttct	tgtctgggaat	gacaacaccg	tcatatctgg	ggacaacaat	agtgtgtctg	600
ggagcaacaa	cactgtcgtg	agtgggaatg	acaataccgt	aaccggcagc	aacctatgtc	660
tatcaggggac	aaaccatatc	gttacagaca	acaacaataa	cgtatccggg	aacgataata	720
atgtatccgg	gagctttcat	accgtatccg	gggggcacaa	tactgtctcc	gggagcaaca	780
ataccgtatc	tgggagcaac	cacgttgtat	ctggaagcaa	caaagtcgtg	acagacgctt	840
aatgatctgt	cagcgcgatg	ttgtttccac	cttaactgag	ctcacgttct	tgtccaagtt	900
cactgtacct	cacagtcagt	tgggtgcgtt	aatcgcgtta	tgtaacttca	tggatatacc	960
atacttttcc	tactatatat	aaaatttccc	tttacataaa	aaaaaaa		1007

<210> 13

<211> 243

<212> PRT

<213> Lolium perenne

<400> 13

Met	Ala	Lys	Cys	Trp	Gln	Leu	Leu	Leu	Phe	Leu	Ala	Leu	Leu	Leu	Pro
1			5						10					15	
Ala	Ala	Ser	Ala	Ala	Ser	Cys	His	Pro	Asp	Asp	Leu	Tyr	Ala	Leu	Arg
			20					25					30		
Asp	Phe	Ala	Gly	Asn	Leu	Arg	Gly	Gly	Gly	Val	Leu	Leu	Arg	Ala	Ala
			35				40						45		
Leu	Pro	Gly	Ala	Ser	Cys	Cys	Gly	Trp	Glu	Gly	Val	Gly	Cys	Asp	Gly
			50			55					60				
Ala	Ser	Gly	Cys	Val	Lys	Ser	Phe	Gln	Ile	Leu	Leu	Lys	Gly	Leu	Thr
65					70				75					80	
Ala	Ala	Gly	Arg	Ser	Leu	Gly	Lys	Ala	Phe	Thr	His	Met	Pro	Leu	His
					85				90					95	
Val	Lys	Pro	Ser	Gln	Gly	Thr	Leu	Asp	Glu	Asp	His	Asn	Thr	Ile	Thr
			100					105						110	

SUBSTITUTE SHEET 7

Gly Ile Asn Asn Thr Val Arg Ser Gly Ser Asn Asn Val Val Ser Gly
115 120 125
Asn Asp Asn Thr Val Ile Ser Gly Asn Asn Asn Val Val Ser Gly Ser
130 135 140
His Asn Thr Val Val Phe Gly Gly Asp Asn Phe Ile Ser Gly Ser Tyr
145 150 155 160
His Val Val Ser Gly Asn His His Val Val Thr Asp Asn Lys Asn Ala
165 170 175
Val Ser Gly Asp His Asn Thr Val Ser Gly Ser Gln Asn Thr Val Ser
180 185 190
Gly Asn His Gln Ile Val Ser Gly Ser His Ser Thr Val Ser Gly Asn
195 200 205
His Asn Thr Val Ser Gly Arg Asn Asn Ser Val Tyr Gly Asn Asn Asn
210 215 220
Ile Val Ser Gly Ser Asn His Val Val Tyr Gly Asn Asn Lys Val Val
225 230 235 240
Thr Gly Gly

<210> 14

<211> 243

<212> PRT

<213> Festuca arundinacea

<400> 14

Met Ala Lys Cys Trp Gln Leu Leu Leu Phe Leu Ala Phe Leu Leu Pro
1 5 10 15
Ala Ala Ser Ala Ala Ser Arg His Pro Asp Asp Leu Arg Ala Leu Gln
20 25 30
Asp Phe Ala Gly Asn Leu Arg Gly Gly Gly Val Val Leu Arg Ala Ala
35 40 45
Leu Ser Gly Gly Ser Cys Cys Asp Trp Glu Gly Ala Gly Cys Asp Gly
50 55 60
Ala Ser Gly Arg Val Thr Ser Phe Gln Ile Leu Leu Lys Gly Leu Thr
65 70 75 80
Thr Ala Gly Arg Ser Leu Gly Lys Ala Phe Thr Asn Met Pro Leu His
85 90 95
Val Lys Ser Ser Gln Gly Thr Leu Asp Glu Glu His Asn Thr Ile Thr
100 105 110
Gly Ile Asn Asn Thr Val Lys Ser Gly Ser Asn Asn Val Val Ser Gly
115 120 125
Asn Asp Asn Thr Val Ile Ser Gly Asn Asn Asn Val Val Ser Gly Ser
130 135 140
His Asn Thr Val Val Phe Gly Gly Asp Asn Phe Leu Ser Gly Ser Asn
145 150 155 160
His Val Val Ser Gly Asn His His Val Val Thr Asp Asn Lys Asn Ala
165 170 175
Val Ser Gly Asp His Asn Thr Val Ser Gly Ser Gln Asn Thr Val Ser
180 185 190
Gly Asn His His Ile Ile Ser Ala Ser His Ser Thr Ile Ser Gly Asn
195 200 205
His Asn Thr Val Ser Gly Ser Asn Asn Phe Val Ser Gly Asn Asn Asn
210 215 220
Ile Val Ser Gly Ser Asn His Val Val Tyr Gly Asn Asn Lys Val Val
225 230 235 240
Thr Gly Gly

SUBSTITUTE SHEET 8

<210> 15
 <211> 267
 <212> PRT
 <213> Lolium perenne

<400> 15
 Met Pro Glu Tyr Met Ala Lys Cys Cys Met Leu Leu Val Phe Leu Gly
 1 5 10 15
 Phe Ile Leu Gln Val Ala Gly Ala Thr Ser Trp Ser Cys His His Asp
 20 25 30
 Asp Leu His Ala Leu Arg Gly Leu Ala Glu Asn Leu Ser Gly Lys Gly
 35 40 45
 Ala Val Arg Leu Arg Ala Ala Trp Ser Gly Ala Ser Cys Cys Ser Trp
 50 55 60
 Glu Gly Val Gly Cys Glu Thr Ala Ser Gly Arg Val Val Ala Leu Arg
 65 70 75 80
 Leu Pro Lys Arg Gly Leu Gly Gly Ile Ile Pro Ser Ser Ile Gly Glu
 85 90 95
 Leu Asp His Leu Arg Tyr Leu Asp Leu Ser Gly Asn Ser Leu Val Gly
 100 105 110
 Glu Val Pro Lys Ser Leu Gln Ile Arg Leu Lys Ser Leu Thr Thr Asp
 115 120 125
 Ser Gln Ser Leu Gly Met Gly Ser Ile Asn Met Leu Leu His Val Ser
 130 135 140
 Ser Arg Arg Thr Leu Asp Glu Glu Pro Asn Thr Ile Ser Gly Thr Asn
 145 150 155 160
 Asn Ser Val Gly Ser Gly Ser Asn Asn Val Val Ser Gly Asn Asp Asn
 165 170 175
 Thr Val Val Ser Gly Asn Asn Asn His Val Ser Gly Ser Asn Asn Thr
 180 185 190
 Val Val Thr Gly Ser Asp Asn Thr Val Val Gly Ser Asn His Val Val
 195 200 205
 Ser Gly Thr Lys His Ile Val Thr Asp Asn Asn Asn Val Val Ser Gly
 210 215 220
 Asn Asp Asn Asn Val Ser Gly Ser Phe His Thr Val Ser Gly Glu His
 225 230 235 240
 Asn Thr Val Ser Gly Ser Asn Asn Thr Val Ser Gly Ser Asn His Ile
 245 250 255
 Val Ser Gly Ser Asn Lys Val Val Thr Asp Gly
 260 265

<210> 16
 <211> 269
 <212> PRT
 <213> Festuca arundinacea

<220>
 <221> VARIANT
 <222> (1)...(269)
 <223> Xaa = Any Amino Acid

<400> 16
 Met Pro Glu Tyr Met Ala Lys Cys Cys Met Leu Leu Leu Leu Leu Ala
 1 5 10 15
 Phe Ile Leu Leu Gln Val Ala Gly Ala Thr Ser Trp Ser Cys His His
 20 25 30

SUBSTITUTE SHEET 9

Asp	Asp	Leu	Arg	Ala	Leu	Arg	Gly	Phe	Ala	Glu	Asn	Leu	Ser	Gly	Lys
	35						40					45			
Gly	Ala	Val	Arg	Leu	Arg	Ala	Ala	Trp	Ser	Gly	Ala	Ser	Cys	Cys	Ser
	50					55					60				
Trp	Glu	Gly	Val	Gly	Cys	Glu	Thr	Ala	Ser	Gly	Arg	Val	Ala	Ala	Leu
65					70					75					80
Arg	Leu	Pro	Lys	Arg	Gly	Leu	Gly	Gly	Thr	Ile	Pro	Ser	Ser	Ile	Gly
			85						90					95	
Glu	Leu	Asp	His	Leu	Arg	Cys	Leu	Asp	Leu	Ser	Gly	Asn	Ser	Leu	Val
			100					105					110		
Gly	Lys	Val	Pro	Lys	Ser	Leu	Gln	Ile	Arg	Leu	Xaa	Ser	Leu	Ser	Thr
		115					120					125			
Asp	Gly	Gln	Ser	Leu	Gly	Met	Gly	Ser	Ile	Asn	Thr	Leu	Leu	His	Val
	130					135					140				
Ser	Ser	Asn	Arg	Arg	Thr	Leu	Asp	Glu	Glu	Pro	Asn	Thr	Ile	Ser	Gly
145					150					155					160
Thr	Asn	Asn	Ser	Val	Gly	Ser	Gly	Ser	Asn	Asn	Val	Val	Ser	Gly	Asn
				165					170					175	
Asp	Asn	Thr	Val	Ile	Ser	Gly	Asn	Asn	Asn	His	Val	Ser	Gly	Ser	Asn
			180					185					190		
Asn	Thr	Val	Val	Thr	Gly	Ser	Asp	Asn	Thr	Leu	Val	Gly	Ser	Asn	His
		195					200					205			
Val	Val	Ser	Gly	Thr	Lys	His	Ile	Val	Thr	Asp	Asn	Asn	Val	Val	
	210					215				220					
Ser	Gly	Asn	Asp	Asn	Asn	Val	Ser	Gly	Ser	Phe	His	Thr	Val	Ser	Gly
225					230					235					240
Glu	His	Asn	Thr	Val	Ser	Gly	Ser	Asn	Asn	Thr	Val	Ser	Gly	Ser	Asn
				245					250					255	
His	Val	Val	Ser	Gly	Ser	Asn	Lys	Val	Val	Thr	Asp	Gly			
			260					265							

<210> 17

<211> 281

<212> PRT

<213> Lolium perenne

<400> 17

Met	Ala	Lys	Cys	Trp	Leu	Leu	Leu	Leu	Phe	Leu	Val	Phe	Leu	Leu	Leu
1			5						10				15		
Ala	Met	Ser	Ala	Thr	Ser	Cys	His	Leu	Asp	Asp	Leu	Arg	Ala	Leu	Arg
			20					25				30			
Gly	Phe	Val	Gly	Asn	Leu	Asn	Gly	Gly	Gly	Ala	Leu	Leu	Arg	Gly	Thr
		35					40				45				
Trp	Ser	Gly	Ser	Ser	Cys	Cys	Asp	Trp	Glu	Gly	Val	Gly	Cys	Asp	Gly
	50					55					60				
Thr	Ser	Gly	Arg	Val	Thr	Ala	Leu	Arg	Leu	Pro	Ile	Ser	Leu	Glu	Asp
65					70					75					80
Cys	Gly	Lys	Leu	Lys	Ser	Leu	Asn	Leu	Ala	Asn	Glu	Arg	Leu	Val	Gly
				85					90					95	
Thr	Ile	Pro	Ser	Trp	Ile	Gly	Glu	Leu	Asp	His	His	Cys	Tyr	Leu	Val
			100					105					110		
Leu	Ser	Asp	Asn	Ser	Leu	Val	Gly	Lys	Ala	Pro	Asn	Ser	Leu	His	Asn
		115					120					125			
Ser	Leu	Gln	Ile	Arg	Leu	Lys	Gly	Leu	Ala	Thr	Ala	Gly	Arg	Ser	Leu
	130					135					140				
Gly	Met	Ala	Phe	Ala	Asn	Met	Pro	Leu	His	Val	Lys	Gly	Asn	Arg	Arg
145					150					155					160

SUBSTITUTE SHEET 10

Thr	Leu	Asp	Glu	Gln	Thr	Asn	Thr	Ile	His	Gly	Thr	Asn	Asn	Thr	Val
				165					170					175	
Arg	Ser	Gly	Asn	Asp	Asn	Ala	Val	Ser	Gly	Asn	Asp	Asn	Thr	Val	Ile
			180					185					190		
Cys	Gly	Asn	Asn	Asn	Thr	Val	Ser	Gly	Ser	Asn	Asn	Thr	Ile	Ala	Ser
		195					200					205			
Gly	Ser	Asp	Asn	Ile	Val	Thr	Gly	Ser	Asn	His	Ile	Val	Cys	Gly	Thr
	210					215					220				
Lys	His	Ile	Ile	Thr	Asp	Asn	Asn	Asn	Asp	Val	Ser	Gly	Asn	Asp	Asn
225					230					235				240	
Asn	Val	Ser	Gly	Ser	Phe	His	Thr	Val	Ser	Gly	Ser	His	Asn	Thr	Val
				245					250					255	
Ser	Gly	Ser	Asn	Asn	Thr	Val	Ser	Gly	Ser	Asn	His	Val	Val	Ser	Gly
			260					265					270		
Ser	Asn	Lys	Leu	Val	Thr	Gly	Asp	Glu							
		275					280								

<210> 18

<211> 277

<212> PRT

<213> Festuca arundinacea

<400> 18

Met	Ala	Lys	Cys	Trp	Leu	Leu	Leu	Leu	Phe	Leu	Val	Val	Leu	Leu	Pro
1				5					10					15	
Ala	Ala	Ser	Ala	Thr	Ser	Cys	His	Pro	Asp	Asp	Leu	Arg	Ala	Leu	Arg
			20					25					30		
Gly	Phe	Val	Gly	Asn	Leu	Asn	Gly	Gly	Gly	Val	Leu	Leu	His	Gly	Ala
	35					40					45				
Trp	Ser	Gly	Ser	Leu	Cys	Cys	Ala	Trp	Glu	Gly	Val	Gly	Cys	Asp	Gly
	50				55						60				
Thr	Ser	Gly	Arg	Val	Thr	Ala	Leu	Arg	Leu	Pro	Ile	Ser	Leu	Lys	Asp
65					70					75				80	
Cys	Gly	Lys	Leu	Lys	Ser	Leu	Asn	Leu	Ala	Asn	Asp	Arg	Leu	Val	Gly
				85					90					95	
Thr	Ile	Pro	Ser	Trp	Ile	Gly	Glu	Leu	Asp	His	Leu	Cys	Tyr	Leu	Val
			100					105					110		
Leu	Ser	Asp	Asn	Ser	Leu	Val	Gly	Lys	Val	Pro	Asn	Ser	Leu	Gln	Ile
		115					120						125		
Arg	Leu	Lys	Gly	Leu	Ala	Thr	Ala	Gly	Arg	Ser	Leu	Gly	Met	Ala	Phe
	130					135					140				
Ala	Asn	Met	Pro	Leu	His	Val	Lys	Gly	Asn	Arg	Arg	Thr	Leu	Asp	Glu
145					150					155				160	
Gln	Thr	Asn	Thr	Ile	Gln	Gly	Thr	Asn	Asn	Thr	Val	Arg	Ser	Gly	Asn
				165					170					175	
Asp	Asn	Ala	Val	Ser	Gly	Asn	Asp	Asn	Thr	Val	Ile	Cys	Gly	Asn	Asn
			180					185					190		
Asn	Thr	Val	Ser	Gly	Ser	Asn	Asn	Thr	Ile	Val	Ser	Gly	Ser	Asp	Asn
		195					200						205		
Ile	Val	Thr	Gly	Ser	Asn	Gln	Val	Val	Cys	Gly	Thr	Lys	His	Ile	Ile
	210					215					220				
Thr	Asp	Asn	Asn	Asn	Asp	Val	Ser	Gly	Asn	Asp	Asn	Asn	Val	Ser	Gly
225					230					235				240	
Ser	Ser	His	Thr	Val	Ser	Gly	Ser	His	Asn	Thr	Val	Ser	Gly	Ser	Asn
				245					250					255	
Asn	Thr	Val	Ser	Gly	Ser	Asn	His	Val	Val	Ser	Gly	Ser	Asn	Lys	Val
			260					265					270		

SUBSTITUTE SHEET 11

Val Thr Gly Asp Glu
275

<210> 19

<211> 277

<212> PRT

<213> Lolium perenne

<400> 19

Met Ala Lys Cys Trp Leu Leu Leu Leu Phe Leu Val Phe Leu Leu Leu
1 5 10 15
Ala Val Cys Ala Thr Ser Cys His Pro Asp Asp Leu Arg Ala Leu Arg
20 25 30
Gly Phe Val Gly Asn Leu Asn Gly Gly Gly Val Leu Leu Arg Glu Thr
35 40 45
Trp Ser Gly Ser Ser Cys Cys Ala Trp Glu Gly Val Gly Cys Asp Gly
50 55 60
Thr Ser Gly Arg Val Thr Ala Leu Arg Leu Pro Ile Ser Leu Glu Asp
65 70 75 80
Cys Gly Lys Leu Lys Ser Leu Asn Leu Ala Asn Glu Arg Leu Val Gly
85 90 95
Thr Ile Pro Ser Trp Ile Gly Glu Leu Asp His His Cys Tyr Phe Val
100 105 110
Leu Ser Asp Asn Ser Leu Val Gly Lys Val Pro Asn Ser Leu Gln Ile
115 120 125
Arg Leu Lys Gly Leu Ala Thr Ala Gly Arg Ser Leu Gly Met Ala Phe
130 135 140
Ala Asn Met Pro Leu His Val Lys Gly Asn Arg Arg Thr Leu Asp Glu
145 150 155 160
Gln Thr Asn Thr Ile His Gly Thr Asn Asn Thr Val Arg Ser Gly Asn
165 170 175
Asp Asn Ala Val Ser Gly Asn Asp Asn Thr Val Met Cys Gly Asn Asn
180 185 190
Asn Thr Val Ser Gly Ser Asn Asn Thr Ile Ser Ser Gly Ser Asp Asn
195 200 205
Ile Val Thr Gly Ser Asn His Ile Val Cys Gly Thr Lys His Ile Ile
210 215 220
Thr Asp Asn Asn Asn Asp Val Ser Gly Asn Asp Asn Asn Val Ser Gly
225 230 235 240
Ser Phe His Thr Val Ser Gly Ser His Asn Thr Val Ser Gly Ser Asn
245 250 255
Asn Thr Val Ser Gly Ser Asn His Val Val Ser Gly Ser Asn Lys Val
260 265 270
Val Thr Gly Asp Glu
275

<210> 20

<211> 280

<212> PRT

<213> Lolium perenne

<400> 20

Met Gly Leu Leu Leu Leu Phe Leu Ala Phe Leu Leu Pro Val Ala Cys
1 5 10 15
Ala Ala Thr Ser Ser Cys His Pro Asp Asp Leu Arg Ala Leu Arg Gly
20 25 30
Phe Ala Lys Asn Leu Gly Gly Gly Gly Val Leu Leu Arg Thr Ala Trp

SUBSTITUTE SHEET 12

35	40	45
Ser Gly Thr Ser Cys Cys Val Trp Glu Gly Val Gly Cys Asn Gly Ala		
50	55	60
Ser Gly Arg Val Thr Thr Leu Trp Leu Pro Arg Arg Gly Leu Ala Gly		
65	70	75
Thr Ile Thr Gly Ala Ser Leu Ala Gly Leu Ala Arg Leu Glu Ser Leu		
85	90	95
Asn Leu Ala Asn Asn Arg Leu Val Gly Thr Ile Pro Ser Trp Ile Gly		
100	105	110
Glu Leu Asp His Leu Leu Tyr Leu Asp Leu Ser His Asn Ser Leu Val		
115	120	125
Gly Glu Leu Pro Asn Leu Lys Gly Leu Thr Thr Thr Gly His Leu Leu		
130	135	140
Gly Met Ala Phe Thr Ser Met Pro Leu Asp Val Lys Pro Asn Arg Arg		
145	150	155
Thr Leu Ala Val Gln Pro Asn Thr Ile Ser Gly Thr Asn Asn Ser Val		
165	170	175
Leu Ser Gly Arg Asn Asn Thr Val Ser Gly Asn Asp Asn Thr Val Ile		
180	185	190
Ser Gly Asn Asn Asn Thr Val Ser Gly Ser Phe Asn Thr Val Val Thr		
195	200	205
Gly Ser Asp Asn Val Leu Thr Gly Ser Asn His Val Val Ser Gly Arg		
210	215	220
Asn His Ile Val Thr Asp Asn Asn Asn Ala Val Ser Gly Asp Asp Asn		
225	230	235
Asn Val Ser Gly Ser Phe His Lys Val Ser Gly Ser His Asn Thr Val		
245	250	255
Ser Gly Ser Asn Asn Thr Val Ser Gly Arg Asn His Val Val Ser Gly		
260	265	270
Ser Asn Lys Val Val Thr Gly Gly		
275	280	

<210> 21

<211> 285

<212> PRT

<213> Festuca arundinacea

<400> 21

Met Gly Leu Leu Leu Leu Phe Leu Gly Phe Leu Leu Pro Ala Ala Cys	
1	5
Ala Ala Thr Ser Cys His Pro Asp Leu Arg Ala Leu Arg Gly	
20	25
Phe Ala Lys Asn Val Gly Gly Gly Val Leu Leu Arg Thr Ala Trp	
35	40
Ser Gly Thr Ser Cys Cys Val Trp Glu Gly Val Gly Cys Asn Gly Ala	
50	55
Ser Gly Arg Ile Thr Thr Leu Trp Leu Pro Arg Arg Gly Leu Ala Gly	
65	70
Thr Ile Thr Gly Ala Ser Leu Ala Gly Leu Ala Arg Leu Glu Ser Leu	
85	90
Asn Leu Ala Asn Asn Arg Leu Val Gly Thr Ile Pro Ser Trp Ile Gly	
100	105
Glu Leu Asp His Leu Leu Tyr Leu Asp Leu Ser His Asn Ser Leu Val	
115	120
Gly Glu Leu Pro Asn Arg Leu Gln Ile Arg Leu Lys Gly Leu Thr Thr	
130	135
Thr Gly His Leu Leu Gly Met Ala Phe Thr Asn Met Pro Leu Asp Val	
	140

SUBSTITUTE SHEET 13

145					150					155					160
Lys	Arg	Asn	Arg	Arg	Thr	Leu	Ala	Ile	Gln	Pro	Asn	Thr	Ile	Ser	Gly
				165					170					175	
Thr	Asn	Asn	Leu	Val	Leu	Ser	Gly	Arg	Asn	Asn	Val	Val	Ser	Gly	Asn
				180					185					190	
Asp	Asn	Thr	Val	Ile	Ser	Glu	Asn	Asn	Asn	Thr	Val	Ser	Gly	Ser	Phe
				195					200					205	
Asn	Thr	Val	Ile	Thr	Gly	Ser	Asp	Asn	Val	Leu	Thr	Gly	Ser	Asn	His
				210					215					220	
Val	Val	Ser	Gly	Arg	Ser	His	Ile	Val	Thr	Asp	Asn	Asn	Asn	Ser	Val
225					230					235					240
Ser	Gly	Asp	Asp	Asn	Asn	Val	Ser	Gly	Ser	Phe	His	Lys	Val	Ser	Gly
				245					250					255	
Ser	His	Asn	Thr	Val	Ser	Gly	Ser	Asn	Asn	Thr	Val	Ser	Gly	Arg	Asn
				260					265					270	
His	Val	Val	Ser	Gly	Ser	Asn	Lys	Ile	Val	Thr	Gly	Gly			
				275					280					285	

<210> 22

<211> 254

<212> PRT

<213> Lolium perenne

<400> 22

Met	Ala	Lys	Cys	Leu	Met	Leu	Leu	Leu	Ser	Phe	Ala	Phe	Leu	Leu	Ser
1				5					10					15	
Val	Ala	Gly	Thr	Ala	Thr	Ala	Thr	Pro	Cys	His	Arg	Asp	Asp	Leu	Arg
			20					25					30		
Ala	Leu	Arg	Gly	Phe	Ala	Glu	Asn	Leu	Gly	Gly	Gly	Gly	Ala	Ile	Ser
		35				40					45				
Leu	Arg	Ala	Ala	Trp	Ser	Gly	Ala	Ser	Cys	Cys	Asp	Trp	Glu	Gly	Val
	50					55				60					
Gly	Cys	Asp	Gly	Ala	Ser	Gly	Arg	Val	Thr	Ala	Leu	Trp	Leu	Pro	Arg
65					70					75					80
Ser	Gly	Leu	Thr	Gly	Pro	Ile	Pro	Ser	Trp	Ile	Cys	Gln	Leu	His	His
			85						90					95	
Leu	Arg	Tyr	Leu	Asp	Leu	Ser	Gly	Asn	Ala	Leu	Val	Gly	Glu	Val	Pro

				100					105					110		
Lys	Asn	Leu	Gln	Val	Gln	Leu	Lys	Gly	Ile	Thr	Asn	Met	Pro	Leu	His	
			115				120					125				
Val	Met	Arg	Asn	Arg	Arg	Ser	Leu	Asp	Glu	Gln	Pro	Asn	Thr	Ile	Ser	
			130				135					140				
Gly	Ser	Asn	Asn	Thr	Val	Arg	Ser	Gly	Ser	Lys	Asn	Val	Leu	Ala	Gly	
145						150				155					160	
Asn	Asp	Asn	Thr	Val	Ile	Ser	Gly	Asp	Asn	Asn	Ser	Val	Ser	Gly	Ser	
				165						170					175	
Asn	Asn	Thr	Val	Val	Ser	Gly	Asn	Asp	Asn	Thr	Val	Thr	Gly	Ser	Asn	
				180						185					190	
His	Val	Val	Ser	Gly	Thr	Asn	His	Ile	Val	Thr	Asp	Asn	Asn	Asn	Asn	
			195				200					205				
Val	Ser	Gly	Asn	Asp	Asn	Asn	Val	Ser	Gly	Ser	Phe	His	Thr	Val	Ser	
			210				215					220				
Gly	Gly	His	Asn	Thr	Val	Ser	Gly	Ser	Asn	Asn	Thr	Val	Ser	Gly	Ser	
225						230					235				240	
Asn	His	Val	Val	Ser	Gly	Ser	Asn	Lys	Val	Val	Thr	Asp	Ala			
				245						250						

SUBSTITUTE SHEET 14

<210> 23
 <211> 262
 <212> PRT
 <213> Festuca arundinacea

<400> 23
 Met Ala Lys Cys Leu Met Leu Leu Leu Ser Phe Ala Phe Leu Leu Ser
 1 5 10 15
 Ala Ala Gly Thr Ala Thr Ala Thr Pro Cys His Arg Asp Asp Leu Arg
 20 25 30
 Ala Leu Arg Gly Phe Ala Glu Asn Leu Gly Gly Gly Gly Ala Leu Ser
 35 40 45
 Leu Arg Ala Ala Trp Ser Gly Ala Ser Cys Cys Asp Trp Glu Gly Val
 50 55 60
 Gly Cys Asp Gly Ala Ser Gly Arg Val Thr Ala Leu Trp Leu Pro Arg
 65 70 75 80
 Ser Gly Leu Thr Gly Pro Ile Pro Ser Trp Ile Cys Gln Leu His His
 85 90 95
 Leu Arg Tyr Leu Asp Leu Ser Gly Asn Ala Leu Val Gly Glu Val Pro
 100 105 110
 Lys Asn Leu Gln Val Gln Leu Lys Gly Leu Thr Ala Ala Gly Arg Ser
 115 120 125
 Gly Phe Thr Asn Met Pro Leu His Val Met Arg Asn Arg Arg Ser Leu
 130 135 140
 Asp Glu Gln Pro Asn Thr Ile Ser Gly Ser Asn Asn Thr Val Arg Ser
 145 150 155 160
 Gly Ser Lys Asn Val Val Ala Gly Asn Asp Asn Thr Val Ile Ser Gly
 165 170 175
 Asp Asn Asn Ser Val Ser Gly Ser Asn Asn Thr Val Val Ser Gly Ser
 180 185 190
 Asp Asn Thr Val Thr Gly Ser Asn His Val Val Ser Gly Thr Asn His
 195 200 205
 Ile Val Thr Asp Asn Asn Asn Asn Val Ser Gly Asn Asp Asn Asn Val
 210 215 220
 Ser Gly Ser Phe His Thr Val Ser Gly Gly His Asn Thr Val Ser Gly
 225 230 235 240
 Ser Asn Asn Thr Val Ser Gly Ser Asn His Val Val Ser Gly Ser Asn
 245 250 255
 Lys Val Val Thr Asp Ala
 260

<210> 24
 <211> 256
 <212> PRT
 <213> Lolium perenne

<400> 24
 Met Ala Lys Cys Leu Met Leu Leu Leu Ser Phe Ala Phe Leu Leu Ser
 1 5 10 15
 Ala Ala Gly Thr Ala Thr Ala Thr Ala Thr Pro Cys His Arg Asp Asp
 20 25 30
 Leu Arg Ala Leu Arg Gly Phe Ala Glu Asn Leu Gly Gly Gly Gly Ala
 35 40 45
 Leu Ser Leu Arg Ala Ala Trp Ser Gly Ala Ser Cys Cys Asp Trp Glu
 50 55 60
 Gly Val Gly Cys Asp Gly Ala Ser Gly Arg Val Thr Ala Leu Trp Leu

SUBSTITUTE SHEET 15

65		70		75		80									
Pro	Arg	Ser	Gly	Leu	Thr	Gly	Pro	Ile	Pro	Ser	Trp	Ile	Phe	Gln	Leu
			85						90					95	
His	His	Leu	Arg	Tyr	Leu	Asp	Leu	Ser	Gly	Asn	Ala	Leu	Val	Gly	Glu
			100						105					110	
Val	Pro	Lys	Asn	Leu	Gln	Val	Gln	Val	Lys	Gly	Ile	Thr	Asn	Met	Pro
			115						120					125	
Leu	His	Val	Met	Arg	Asn	Arg	Arg	Ser	Leu	Asp	Glu	Gln	Pro	Asn	Thr
			130						135					140	
Ile	Ser	Gly	Ser	Asn	Asn	Thr	Val	Arg	Ser	Gly	Ser	Lys	Asn	Val	Leu
			145											150	
Ala	Gly	Asn	Asp	Asn	Thr	Val	Ile	Ser	Gly	Asp	Asn	Asn	Ser	Val	Ser
			165											170	
Gly	Ser	Asn	Asn	Thr	Val	Val	Ser	Gly	Asn	Asp	Asn	Thr	Val	Thr	Gly
			180											185	
Ser	Asn	His	Val	Val	Ser	Gly	Thr	Asn	His	Ile	Val	Thr	Asp	Asn	Asn
			195											200	
Asn	Asn	Val	Ser	Gly	Asn	Asp	Asn	Asn	Val	Ser	Gly	Ser	Phe	His	Thr
			210											215	
Val	Ser	Gly	Gly	His	Asn	Thr	Val	Ser	Gly	Ser	Asn	Asn	Thr	Val	Ser
			225											230	
Gly	Ser	Asn	His	Val	Val	Ser	Gly	Ser	Asn	Lys	Val	Val	Thr	Asp	Ala
			245											250	
														255	

<210> 25
 <211> 1083
 <212> DNA
 <213> Lolium perenne

<400> 25	
acttgcattc caaaaagggtt tcttgcatac acgtatttag aacaccagaa cttaatccat	60
ggcgaaatgt tggctgctgc tgctcttctt ggtgttcctc ttgctggcca tgagcgcgac	120
gtcgtgccac ctggatgacc tccgcgcgct gcggggcttt gtcgggaacc tcaatggcgg	180
gggtgcccctt ctccgtggaa catggtctgg ctctcatgc tgcgattggg aagggtgtggg	240
ctgcgatggt acaagcggcc gcgtcacggc gttgcggctt ccgattagcc tgcgaggactg	300
cggtaagctc aagtcgctca accttgccaa cgaaagattg gttggcacca tcccgtcgtg	360
gattggtgag cttgaccacc attgctactt ggttctctcg gataattcat tggttggtaa	420
ggcacccaat agtttgaca atagtttgca gataagactc aagggcctcg ccaccgctgg	480
tcgttacta ggtatggctt tcgctaacat gccattgcat gtgaagggga accgaagaac	540
cctcgacgaa caaacaata caatacatgg gaccaacaac actgttagat ctgggaacga	600
caatgctgtt tctgggaacg acaacactgt catatgtggg aacaacaaca ctgtgtctgg	660
gagcaacaac accattgcat ctggcagtga caatatcgta actggcagca accatattgt	720
atgtgggacc aaacatata taactgataa caacaatgac gtatccggca atgataataa	780
tgtatctggg agcttccata ctgtatccgg gagccacaat actgtatctg gaagtaacaa	840
cactgtatct ggaagcaacc atgtcgtatc tgggaagcaac aaagtcgtga caggagatga	900
atgatttgtc aggggattgc ttccatcttt cctaaaggag ctctcaccct agtccaagtt	960
cgggtgcagct cacaatcact tggtagggac aatcgagtta tgtaacttca tggatatagc	1020
atcattctcc ctgttttaaat atactttcct gaaaatatct tacataaatg ctgaaaaaaaa	1080
aaa	1083

<210> 26
 <211> 281
 <212> PRT
 <213> Lolium perenne

<400> 26
 Met Ala Lys Cys Trp Leu Leu Leu Leu Phe Leu Val Phe Leu Leu Leu

SUBSTITUTE SHEET 16

1	5	10	15
Ala Met Ser Ala Thr Ser Cys His Leu Asp Asp Leu Arg Ala Leu Arg			
	20	25	30
Gly Phe Val Gly Asn Leu Asn Gly Gly Ala Leu Leu Arg Gly Thr			
	35	40	45
Trp Ser Gly Ser Ser Cys Cys Asp Trp Glu Gly Val Gly Cys Asp Gly			
	50	55	60
Thr Ser Gly Arg Val Thr Ala Leu Arg Leu Pro Ile Ser Leu Glu Asp			
65	70	75	80
Cys Gly Lys Leu Lys Ser Leu Asn Leu Ala Asn Glu Arg Leu Val Gly			
	85	90	95
Thr Ile Pro Ser Trp Ile Gly Glu Leu Asp His His Cys Tyr Leu Val			
	100	105	110
Leu Ser Asp Asn Ser Leu Val Gly Lys Ala Pro Asn Ser Leu His Asn			
	115	120	125
Ser Leu Gln Ile Arg Leu Lys Gly Leu Ala Thr Ala Gly Arg Ser Leu			
	130	135	140
Gly Met Ala Phe Ala Asn Met Pro Leu His Val Lys Gly Asn Arg Arg			
145	150	155	160
Thr Leu Asp Glu Gln Thr Asn Thr Ile His Gly Thr Asn Asn Thr Val			
	165	170	175
Arg Ser Gly Asn Asp Asn Ala Val Ser Gly Asn Asp Asn Thr Val Ile			
	180	185	190
Cys Gly Asn Asn Asn Thr Val Ser Gly Ser Asn Asn Thr Ile Ala Ser			
	195	200	205
Gly Ser Asp Asn Ile Val Thr Gly Ser Asn His Ile Val Cys Gly Thr			
	210	215	220
Lys His Ile Ile Thr Asp Asn Asn Asn Asp Val Ser Gly Asn Asp Asn			
225	230	235	240
Asn Val Ser Gly Ser Phe His Thr Val Ser Gly Ser His Asn Thr Val			
	245	250	255
Ser Gly Ser Asn Asn Thr Val Ser Gly Ser Asn His Val Val Ser Gly			
	260	265	270
Ser Asn Lys Val Val Thr Gly Asp Glu			
	275	280	

<210> 27
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in the lab

<400> 27
 gaattcggta ccccatcaac

20

<210> 28
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in the lab

<400> 28
 gcatgtgagt gaacgcctta

20

SUBSTITUTE SHEET 17

<210> 29
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in the lab

<400> 29
 gaattcggta ccccatcaac 20

<210> 30
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in the lab

<400> 30
 gtgatcaagc tcaccaatcg 20

<210> 31
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in the lab

<400> 31
 gaattcggta ccccatcaac 20

<210> 32
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in the lab

<400> 32
 aggatgctcc tgtgatggtc 20

<210> 33
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in the lab

<400> 33
 gaattcggta ccccatcaac 20

<210> 34

SUBSTITUTE SHEET 18

<211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in the lab

<400> 34
 tgggtgaagct gacaaatcca 20

<210> 35
 <211> 25
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in the lab

<400> 35
 gaattcggcg tcgtgccacc ctgat 25

<210> 36
 <211> 33
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in the lab

<400> 36
 tctagaggat ccttaacctc ctgtcacgca ttt 33

<210> 37
 <211> 28
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in the lab

<400> 37
 gaattcggac gaagaccaca atacaata 28

<210> 38
 <211> 33
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in the lab

<400> 38
 tctagaggat ccttaacctc ctgtcacgca ttt 33

<210> 39
 <211> 22
 <212> DNA

SUBSTITUTE SHEET 19

<213> Artificial Sequence

<220>

<223> Made in the lab

<400> 39

gaattcggca acgtcgtggt cg

22

<210> 40

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Made in the lab

<400> 40

tctagaggat ccttaaccat ctgttacgac ttt

33

<210> 41

<211> 25

<212> DNA

<213> Artificial Sequence

<220>

<223> Made in the lab

<400> 41

gaattcggcg acgtcgtgcc acctg

25

<210> 42

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Made in the lab

<400> 42

tctagaggat cctcattcat ctctgtcac gag

33

<210> 43

<211> 22

<212> DNA

<213> Artificial Sequence

<220>

<223> Made in the lab

<400> 43

gaattcgacg ccatgccacc gc

22

<210> 44

<211> 33

<212> DNA

<213> Artificial Sequence

SUBSTITUTE SHEET 20

<220>

<223> Made in the lab

<400> 44

tctagaggat ccttaagcgt ctgtcacgac ttt

33